

DOCUMENT NO. \_\_\_\_\_  
NO CHANGE IN CLASS ☒  
DECLASSIFIED ☐  
CLASS CHANGED TO: TS-S  
NEXT REVIEW DATE: 8/20/77

**CONFIDENTIAL**  
SECURITY INFORMATION

AUTH: HR 70-2  
DATE: 6/10/81 REVIEWER: 037169

FIELD TESTS OF AN EXPERIMENTAL MODEL  
OF THE CACHE MARKER SYSTEM

Contract No.

6 November 1953

**WASHINGTON TSS-PROV**

This document contains information affecting the national  
defense of the United States within the meaning of the  
Espionage Laws, Title 18, U.S.C., Sections 793 and 794,  
the transmission or the revelation of its contents in any  
manner to an unauthorized person is prohibited by law.

**CONFIDENTIAL**  
SECURITY INFORMATION

**CONFIDENTIAL**  
**SECURITY INFORMATION**

**FIELD TESTS OF AN EXPERIMENTAL MODEL**  
**OF THE CACHE MARKER SYSTEM**

Contract No.

50X1

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

50X1

**CONFIDENTIAL**  
**SECURITY INFORMATION**

CONFIDENTIAL  
SECURITY INFORMATION

### SUMMARY

Tests of the experimental model of the cache marker system were performed in the field to determine the ability of the detector to accurately locate the position of the transponder when only the approximate position of the transponder is known. The results of the tests showed that the position of the transponder could be determined to within one or two inches of its center. The detector demonstrated a horizontal range of detectability of four feet with the transponder buried five feet below the surface of the ground and five feet with the transponder buried four feet below the surface of the ground.

CONFIDENTIAL  
SECURITY INFORMATION

### REPORT OF FIELD TESTS

On October 30, 1953, a representative of the sponsor and representatives of [ ] conducted a field test of the cache marker system [ ] 50X1  
Virginia.

The field test consisted of burying three transponders, locating the positions of the transponders with the detector, and digging up the transponder at the indicated positions to determine how accurately their positions had been located. The horizontal ranges at which the transponders were detectable were measured. The frequency shifts of the resonant frequencies of the transponders were measured with the detector.

The transponders used for this test were resonant at 83, 98.5 and 106.3 KC in air. Their construction consisted of a plexiglass coil form wound with 60 turns of Litz wire made of 24 strands of No. 30 wire woven on a glass fiber core. The coil and its tuning capacitor were impregnated with a heavy coating of ceres wax and incased in fibre glass reinforced polyester resin shell.

The site was prepared by digging holes five feet deep with a trench digger. The transponders were placed in these holes and the holes were filled with dirt with the use of a bulldozer. Two of the transponders were buried five feet below the level of the ground and the third was buried at four feet below the ground. After the holes had been filled the bulldozer leveled off the ground so that the locations of the holes were not discernible. Markers which had been left to locate the positions of the transponders had been shifted by the bulldozer.

CONFIDENTIAL  
SECURITY INFORMATION

The representative of the sponsor was briefly instructed on how the detector was used and then he proceeded to locate the first transponder. He encountered some difficulty at first for two reasons. The rotating capacitor operated intermittently and he mixed up the use of the amplitude control and the fine tuning control. He had much less difficulty in locating the other two transponders.

The transponders buried at a depth of five feet had a horizontal range of detectability of about four feet. The transponder buried at a depth of four feet had a horizontal range of detectability of five feet. Measurements were made to determine how close the transponder would have to be approached when walking rapidly along a straight path to obtain a positive indication of the presence of the transponder. This information was obtained with the detector tuned to the resonant frequency of the transponder in the ground without any further adjustment as the detector was carried along. This distance was found to be about two to two and a half feet. This determines that where the detector is tuned to the proper frequency before the search is started, detection should be accomplished by walking parallel paths four to five feet apart.

The positions of the transponders as located with the detector were marked and the ditch digger dug holes at these positions. It was found that the positions had been located to within one or two inches of the centers of the transponders.

The ground consisted primarily of clay and was wet due to two preceding days of rain. The resonant frequency was lowered by the following amounts due to the increase in distributed capacity caused by having a greater dielectric constant for the surrounding medium. For the 83 KC transponder

50X1

CONFIDENTIAL  
SECURITY INFORMATION

0.28 KC, for the 98.5 KC transponder 0.30 KC, and for the 106.3 KC transponder  
0.48 KC.

The sponsor's representative indicated that operation could be improved by packaging the detector so that it could be more easily carried with the detector coil parallel to the ground and by elimination of the rotating capacitor. Both items are presently under consideration.